DERWENT-ACC-NO: 2000-401289

DERWENT-WEEK: 200105

TITLE: Rolling contact body for heavy duty bearings or ball circulation spindle devices consists of carbonitrided vanadium-containing low alloy steel with surface containing fine carbide or carbonitride precipitates

INVENTOR: MIYAGUCHI, K; OHORI, M ; YAMAMURA, K

PATENT-ASSIGNEE: MIYAGUCHI, K OHORI, M YAMAMURA, K NSK LTD[NSEI] , NIPPON SEIKO KK[NSEI]

PRIORITY-DATA: 1999JP-0128940 (May 10, 1999) , 1998JP-0329733 (November 19, 1998)

PATENT-FAMILY:

PUB-NO	PUB-DATE	LANGUAGE	PAGES	MAIN-IPC
GB 2345296 B	January 17, 2001	N/A	000	C22C 038/24F16C 033/30C22C 038
DE 19955565 A1	June 8, 2000	N/A	014	/24C23C 008/32
GB 2345296 A	July 5, 2000	N/A	000	
JP 2000212721 A	August 2, 2000	N/A	008	

APPLICATION-DATA:

PUB-NO	APPL-DESCRIPTOR	APPL-NO	APPL-DATE
GB 2345296B	N/A	1999GB-0027194	November 17, 1999
DE 19955565A1	N/A	1999DE-1055565	November 18, 1999
GB 2345296A	N/A	1999GB-0027194	November 17, 1999
JP2000212721A	N/A	1999JP-0128940	May 10, 1999

INT-CL (IPC): C22C038/00, C22C038/24 , C22C038/46 , C23C008/32 , F16C029/00 , F16C033/30 , F16C033/32 , F16C033/62 , F16H025/22

ABSTRACTED-PUB-NO: DE 19955565A

BASIC-ABSTRACT:

NOVELTY - A rolling contact body consists of a carbonitrided

vanadium-containing low alloy steel with a large number of fine carbide or carbonitride precipitates in its surface layer.

DETAILED DESCRIPTION - A rolling contact body consists of an alloy steel of composition (by wt.) 0.1-0.7% C, 0.1-1.5% Si, 0.1-1.5% Mn, 0.5-3.0% Cr, 0.6-2.0% V, at most 3.0% Mo, at most 2.0% Ni, balance Fe and impurities, and has a finished product surface containing 0.7-1.3% C, 0.15-0.3% N and, per 100 microns 2, at least 400 carbide, nitride and/or carbonitride precipitate particles of at most 0.1 microns diameter.

An INDEPENDENT CLAIM is also included for production of the above rolling contact body by carbonitriding a steel of the above composition at at least 920 deg. C.

USE - As a rolling contact body for heavy duty rolling contact bearings, used in iron and steel equipment, agricultural machines, vehicles, construction machines and other industrial machines, or for ball circulation spindle devices used instead of hydraulic cylinders in injection molding or pressing equipment.

ADVANTAGE - The combination of vanadium addition and high temperature carbonitriding causes fine carbide or carbonitride precipitates to be formed in the surface layer to provide excellent wear and abrasion resistance.

ABSTRACTED-PUB-NO: GB 2345296B

EQUIVALENT-ABSTRACTS:

NOVELTY - A rolling contact body consists of a carbonitrided vanadium-containing low alloy steel with a large number of fine carbide or carbonitride precipitates in its surface layer.

DETAILED DESCRIPTION - A rolling contact body consists of an alloy steel of composition (by wt.) 0.1-0.7% C, 0.1-1.5% Si, 0.1-1.5% Mn, 0.5-3.0% Cr, 0.6-2.0% V, at most 3.0% Mo, at most 2.0% Ni, balance Fe and impurities, and has a finished product surface containing 0.7-1.3% C, 0.15-0.3% N and, per 100 microns 2, at least 400 carbide, nitride and/or carbonitride precipitate particles of at most 0.1 microns diameter.

An INDEPENDENT CLAIM is also included for production of the above rolling contact body by carbonitriding a steel of the above composition at at least 920 deg. C.

USE - As a rolling contact body for heavy duty rolling contact bearings, used in iron and steel equipment, agricultural machines, vehicles, construction machines and other industrial machines, or for ball circulation spindle devices used instead of hydraulic cylinders

in injection molding or pressing equipment.

ADVANTAGE - The combination of vanadium addition and high temperature carbonitriding causes fine carbide or carbonitride precipitates to be formed in the surface layer to provide excellent wear and abrasion resistance.

CHOSEN-DRAWING: Dwg.0/4

TITLE-TERMS: ROLL CONTACT BODY HEAVY DUTY BEARING BALL CIRCULATE SPINDLE DEVICE CONSIST CARBONITRIDED VANADIUM CONTAIN LOW ALLOY STEEL SURFACE CONTAIN FINE CARBIDE CARBONITRIDE PRECIPITATION

DERWENT-CLASS: M13 M27 Q62 Q64

CPI-CODES: M13-D03; M27-B04; M27-B04C; M27-B04M; M27-B04S; M27-B04V;

SECONDARY-ACC-NO:

CPI Secondary Accession Numbers: C2000-121586

Non-CPI Secondary Accession Numbers: N2000-300460

DERWENT-ACC-NO: 2000-106491

DERWENT-WEEK: 200228

TITLE: Case hardening steel e.g. for transmission components of helicopters, competition vehicles and heat engines

INVENTOR: DUBOIS, P

PATENT-ASSIGNEE: DUBOIS, P AUBERT & DUVAL[AUBEN] , AUBERT & DUVAL SA [AUBEN]

PRIORITY-DATA: 1998FR-0008247 (June 29, 1998)

PATENT-FAMILY:

PUB-NO	PUB-DATE	LANGUAGE	PAGES	MAIN-IPC
EP 1097248 B1	April 24, 2002	F	000	C22C 038/44C22C 038/44C22C 038
WO 200000658 A1	January 6, 2000	F	035	/44C22C 038/44C22C 038/44
FR 2780418 A1	December 31, 1999	N/A	000	
EP 1097248 A1	May 9, 2001	F	000	
BR 9912226 A	May 8, 2001	N/A	000	

DESIGNATED-STATES: AT BE CH DE DK ES FI FR GB GR IT LI LU SE BR CA US AT BE CH CY DE DK ES FI FR GB GR IE IT LU MC NL PT SE AT BE CH DE DK ES FI FR GB GR IT LI LU SE

APPLICATION-DATA:

PUB-NO	APPL-DESCRIPTOR	APPL-NO	APPL-DATE			
EP 1097248B1	N/A	1999EP-0926549	June 28, 1999			
EP 1097248B1	N/A	1999WO-FR01543	June 28, 1999			
EP 1097248B1	Based on	WO 200000658	N/A			
WO	N/A	1999WO-FR01543	June 28, 1999 200000658A1	N/A	1998FR-0008247	June 29, 1998
FR 2780418A1	N/A	1999EP-0926549	June 28, 1999			

EP 1097248A1	Based on	WO 200000658	N/A
EP 1097248A1	N/A	1999BR-0012226	June 28, 1999
BR 9912226A	N/A	1999WO-FR01543	June 28, 1999
BR 9912226A	Based on	WO 200000658	N/A
BR 9912226A			

INT-CL (IPC): C22C038/42, C22C038/44 , C22C038/46 , C23C008/00

ABSTRACTED-PUB-NO: EP 1097248B

BASIC-ABSTRACT:

NOVELTY - A case hardening steel, with specified contents of nickel, manganese, copper, cobalt, chromium, molybdenum and vanadium, is new.

DETAILED DESCRIPTION - A novel case hardening steel has the composition (by wt.) 0.06-0.18% C, 0.5-1.5% Si, 0.2-1.5% Cr, 1-3.5% Ni, 1.1-3.5% Mo, not more than 1.6% Mn, not more than 0.4% V, not more than 2% Cu, not more than 4% Co, balance Fe and impurities, with the proviso that Ni + Mn + 1.5 Cu + 0.5 Co = 2.5 to 5 wt. % and Cr + Mo + V = 2.4 to 3.7 wt. %. INDEPENDENT CLAIMS are also included for the following:

(i) production of case hardened parts by producing the above steel in an arc furnace, subjecting cast ingots to reheating and hot working, carrying out a homogenization and grain refining heat treatment, case hardening and heat treating according to use;

(ii) a steel part having the above composition; and

(iii) a steel part made by the above process.

Preferred Features: The steel has the composition 0.09-0.16 % C, 0.7-1.3 % Si, 0.5-1.2% Cr, 2-3 % Ni, 1.5-2.5% Mo, 0.2-0.7 % Mn, 0.15-0.35 % V, 0.3-1.1 % Cu, not more than 1.5 % Co, not more than 0.020 % P, not more than 0.010 % S, not more than 0.1 % each of Al, Ce, Ti, Zr, Ca and Nb, balance Fe and impurities. Arc furnace melting may be carried out by vacuum induction melting and may be followed by consumable electrode remelting. The homogenization and grain refining heat treatment step comprises normalizing at above the Ac3 point, air

cooling and soft tempering at below the Ac1 point. Case hardening is carried out at low pressure and is followed by cooling to ambient temperature, reheating to 900 -1050 deg. C, oil or gas quenching and tempering at up to 350 deg. C.

USE - For e.g. transmission box pinions, bearings and shafts for helicopters and competition vehicles, pinions, camshafts and other parts used in heat engine distribution systems, fuel injectors and compressors.

ADVANTAGE - The steel permits tempering of the hardened case at up to 350 deg. C and has good hot hardness at operating temperatures of up to 280 deg. C, while maintaining satisfactory core properties.

DESCRIPTION OF DRAWING(S) - The figure shows the variation in micro-hardness as a function of depth for two specimens using tempering temperatures of 150 and 350 deg. C respectively.

ABSTRACTED-PUB-NO: WO 200000658A

EQUIVALENT-ABSTRACTS:

NOVELTY - A case hardening steel, with specified contents of nickel, manganese, copper, cobalt, chromium, molybdenum and vanadium, is new.

DETAILED DESCRIPTION - A novel case hardening steel has the composition (by wt.) 0.06-0.18% C, 0.5-1.5% Si, 0.2-1.5% Cr, 1-3.5% Ni, 1.1-3.5% Mo, not more than 1.6% Mn, not more than 0.4% V, not more than 2% Cu, not more than 4% Co, balance Fe and impurities, with the proviso that Ni + Mn + 1.5 Cu + 0.5 Co = 2.5 to 5 wt. % and Cr + Mo + V = 2.4 to 3.7 wt. %. INDEPENDENT CLAIMS are also included for the following:

(i) production of case hardened parts by producing the above steel in an arc furnace, subjecting cast ingots to reheating and hot working, carrying out a homogenization and grain refining heat treatment, case hardening and heat treating according to use;

(ii) a steel part having the above composition; and

(iii) a steel part made by the above process.

Preferred Features: The steel has the composition 0.09-0.16 % C, 0.7-1.3 % Si, 0.5-1.2% Cr, 2-3 % Ni, 1.5-2.5% Mo, 0.2-0.7 % Mn, 0.15-0.35 % V, 0.3-1.1 % Cu, not more than 1.5 % Co, not more than 0.020 % P, not more than 0.010 % S, not more than 0.1 % each of Al, Ce, Ti, Zr, Ca and Nb, balance Fe and impurities. Arc furnace melting may be carried out by vacuum induction melting and may be followed by consumable electrode remelting. The homogenization and grain refining heat treatment step comprises normalizing at above the Ac3 point, air

cooling and soft tempering at below the Ac1 point. Case hardening is carried out at low pressure and is followed by cooling to ambient temperature, reheating to 900 -1050 deg. C, oil or gas quenching and tempering at up to 350 deg. C.

USE - For e.g. transmission box pinions, bearings and shafts for helicopters and competition vehicles, pinions, camshafts and other parts used in heat engine distribution systems, fuel injectors and compressors.

ADVANTAGE - The steel permits tempering of the hardened case at up to 350 deg. C and has good hot hardness at operating temperatures of up to 280 deg. C, while maintaining satisfactory core properties.

DESCRIPTION OF DRAWING(S) - The figure shows the variation in micro-hardness as a function of depth for two specimens using tempering temperatures of 150 and 350 deg. C respectively.

CHOSEN-DRAWING: Dwg.1/7

TITLE-TERMS: CASE HARDEN STEEL TRANSMISSION COMPONENT HELICOPTER COMPETE VEHICLE HEAT ENGINE

DERWENT-CLASS: M24 M27

CPI-CODES: M24-D; M27-A04; M27-A04C; M27-A04M; M27-A04N; M27-A04S;

UNLINKED-DERWENT-REGISTRY-NUMBERS: ; 1666U ; 1669U ; 1725U ; 1734U

SECONDARY-ACC-NO:

CPI Secondary Accession Numbers: C2000-032100